

observed "working" an inflorescence. That particular inflorescence subsequently produced the only pod that developed on a *L. texensis* plant without experimental manipulation. It appears evident that pods are not produced by florets of *L. texensis* unless they have been "worked" by bees or man. Several of the unbagged inflorescences of *L. subcarnosus* set a few pods.

The Plant Research Institute,
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NEW NORTH AMERICAN ANDROPOGONS OF SUBGENUS AMPHILOPHIS AND A KEY TO THOSE SPECIES OCCURRING IN THE UNITED STATES¹

FRANK W. GOULD

The Old and New World andropogons of the subgenus *Amphilophis* comprise a relatively distinct group, recognized as a separate genus by many systematists including O. Stapf, C. E. Hubbard, A. Camus, J. T. Henrard, and S. T. Blake. Both *Amphilophis* Nash and *Bothriochloa* Kuntze have been proposed as generic names for the species comprising this subgenus, with *Bothriochloa* (1891) antedating *Amphilophis* (1901). The name *Amphilophis* was first used by Trinius as a section name under *Andropogon*. Included in the section were a number of species belonging to *Vetiveria*, *Sorghastrum*, and *Sorghum*, as well as *Andropogon saccharoides* and its allies. Hackel, in his monograph (1889), took up *Amphilophis* as a subgenus name for the *A. saccharoides* group. *Bothriochloa* never has been officially published as a subgeneric name.

The *Amphilophis* andropogons are distinguished primarily on the basis of inflorescence characters. The pedicels, and at least the terminal rachis joints, have thickened margins and a medial groove or a broad thin membranous central area. The inflorescence characteristically is a leafless terminal panicle, with several to numerous racemose branches. In a few species there are as few as two or three branches per inflorescence.

The following new species and new name combinations are proposed in *Andropogon* rather than in *Bothriochloa* primarily to conform with the standard United States treatments of the genus (Hitchcock, 1951; Swallen, 1951; Gould, 1951; Gleason, 1952; Harrington, 1954). The Latin diagnoses have been kindly supplied by Dr. Lloyd Shinnery of Southern Methodist University. Mr. Jason R. Swallen of the United States National Museum has aided in clarifying the relationships of generic and subgeneric names. The writer is indebted to the curators of the herbaria of

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the following institutions for the loan of specimens during the course of study: University of Arizona (ARIZ), University of California (UC), University of Michigan (MICH), University of Texas (TEX), Southern Methodist University (SMU), and Smithsonian Institution (US). Specimens of the Tracy Herbarium, A. and M. College of Texas, are cited as (TRACY). Collections of the writer are indicated by number alone. Nursery grown plants were made available through the facilities and seed introduction program of the Texas Agricultural Experiment Station, and the Plant Introduction Section of the United States Agricultural Research Service.

Andropogon springfieldii sp. nov. Perennis caespitosa 30–80 cm. alta; nodi dense barbati pilis patentibus 3–7 mm. longis; foliorum laminæ 2–3 (–5) mm. latæ glabræ vel hispidæ prope ligulam bicrinatæ; inflorescentia dense villosa pilis 5–10 mm. longis, ramosa ramis 2–8 in axi 1–4 cm. longo, inferioribus raro ramulosis; racheos segmenta et pedicelli subæquales sulcati marginibus crassulis villosis; spicula sessilis 6.0–7.3 mm. longa, gluma inferiore acuta vel bifidula infra mediam pilosa interdum supra mediam glanduloso-punctulata, lemmatis arista 20–26 mm. longa; spicula pedicellata sterilis angusta 5 mm. longa, pedicello 1–2 mm. longior; meiosis pollinis regularis; chromosomata somatica 120.

Tufted perennial with culms 30–80 cm. tall; culm nodes densely bearded with spreading hairs, these usually 3–7 mm. long; leaf blades 2–3, occasionally to 5 mm. broad, glabrous or sparsely pustulate-hispid on the axial surface and with tufts of hair on each side of the ligule; panicle densely white-villous, with 2–8 racemose branches, these infrequently rebranched; rachis joints and pedicels about equal, with thickened, densely villous margins and a broad thin membranous central area; hairs of the inflorescence 5–10 mm. long; sessile spikelets mostly 5.5–7.3 (–8.5) mm. long, the first glume acute or minutely bifid at the apex, hairy on the lower third or half of the dorsal surface, occasionally with a faint glandular pit or depression above the middle; awn of the lemma 20–26 mm. long; pedicelled spikelet sterile, narrow, averaging 4–5 mm. long and 1–2 mm. longer than the pedicel; pollen meiosis regular; chromosome number $2n=120$.

Type: From plant grown in nursery of Texas Agricultural Experiment Station, College Station, Texas, *F. W. Gould 6642* (type, TRACY; isotypes, US, UC, TEX, SMU, ARIZ). Original seed from near Scholle, Socorro County, New Mexico (*Wayne Springfield*, 20 August 1950).

Distribution: Western Texas, New Mexico, and northern Arizona; Argentina.

Specimens examined: UNITED STATES. TEXAS. Andrews County: Shafter Lake, *Tharp et al. 43024* (TEX). Brewster County: Alpine, *Bailey 29931* (TRACY); Chisos Mts., *Lundell 13286* (UC); Glass Mts., *Warnock W370* (TRACY) Culbertson County; southeast of Van Horn, *Davis et al. 90* (TRACY); Guadalupe Mts., *Lee 67* (TEX); base of El Capitan, *Tharp and Gimbrede 51-1543* (TRACY); Pine Spring, *Young* in 1916 (TEX). Dawson County: *Texas Soil Survey* in 1922

(TRACY). Jeff Davis County: 30 miles west of Fort Davis, *Reeves and Morrow G-165* (P.I. 216668) (TRACY); northern part of county, *Burnett 9* (TEX). Presidio County: *Taylor* in 1941 (TEX). NEW MEXICO. Chaves County: Roswell, *Hinckley* in 1936 (MICH). Lincoln County: Carrizozo, *Grassl 239* (MICH). Sierra County: Cuchillo, *Archer 416* (MICH). Socorro County: Scholle, seed collected by *Springfield* in 1950. Type collection from plants grown at College Station, Texas, *Gould 6642* (TRACY, US, UC, TEX, SMU, ARIZ). Valencia County: Paguete, *Weatherwax 2763* (TRACY). Without locality, *Wright 2103* (TRACY). ARIZONA. Coconino County: Havasupai Canyon, *Clover 7121* (MICH). ARGENTINA. Buenos Aires: west of Argerich, *Eyerdam et al. 23510* (UC).

This plant most commonly has been identified as *Andropogon barbinodis* Lag., from which it differs typically in the smaller habit, narrower blades, longer nodal hairs, panicles with fewer branches, shorter axis, and more densely white-villous pedicels and rachis joints, and the lower chromosome number.

The genetical relationship of this species with other taxa of the *Amphilophis* section is obscure. The short panicle axis, few panicle branches, large spikelets, and occasional pitted glume of the sessile spikelet suggest relationship with *Andropogon edwardsianus* Gould. The latter has deeply pitted glumes and the minimum chromosome number of the New World taxa, $2n=60$.

The dense villous pubescence of pedicels and rachis joints of *A. springfieldii* is not equalled in any other North American species of the *Amphilophis* section. It is, however, very similar to the condition characteristic of South American plants referable to *A. saccharoides* var. *erianthoides* Hack. The latter, undoubtedly specifically distinct from *A. saccharoides*, also has a chromosome number of $2n=60$. Both *A. saccharoides* var. *erianthoides* and *A. edwardsianus* are known to occur in Uruguay. *Andropogon springfieldii* is known to the writer from Argentina and undoubtedly also is present in Uruguay.

Andropogon reevesii sp. nov. Perennis caespitosa 30–80 cm. alta geniculata demum ramosa; nodi glabri vel puberuli; folia glauca scabra firma; vagina glabra; ligula membranacea 2–4 mm. longa; lamina 2–4 mm. lata longe acuminata glabra vel supra parce pilosa; inflorescentia 6–8 cm. longa subflabellata sat pilosa ramis 6–9 subaequalibus 3–6 cm. longis simplicibus vel inferioribus ramulosis in axi 1.0–3.5 cm. longo; racheos segmenta et pedicelli $\frac{1}{2}$ – $\frac{3}{4}$ spiculas sessiles aequantes cum sulca media membranacea marginis crassulos ciliatos aequante; spicula sessilis 4–5 mm. longa glauca late acuta, gluma inferiore plerumque infra mediam parce pilosa superne marginibus scabris vel puberulis non pertusa; lemmatis fertilis arista 12–15 mm. longa; spicula pedicellata sterilis angusta 3.0–4.5 mm. longa pedicello longior; meiosis pollinis regularis; chromosomata somatica 120.

Perennial bunchgrass; culms mostly 30–80 cm. tall, geniculate and freely branching below in age; culm nodes puberulent to glabrous; leaves glaucous, scabrous, very firm in texture; sheaths glabrous; ligule membranous, 2–4 mm. long; blades mostly 2–4 mm. broad, relatively narrow and stiff, tapering to a long-acuminate tip, glabrous or with a few scattered

hairs on the axial surface; panicles 6–8 mm. long, somewhat flabellate, moderately hairy, with an axis 1.0–3.5 cm. long and usually 6–9 branches, these unbranched or the lowermost simply rebranched; panicle branches mostly 3–6 cm. long, the uppermost about as long as the lower; rachis joints and pedicels $\frac{1}{2}$ to $\frac{3}{4}$ as long as the sessile spikelets, with a membranous medial groove about as wide as the thickened ciliate margins; sessile spikelets mostly 4–5 mm. long, glaucous, broadly acute at the apex, the first glume usually with a few coarse hairs below the middle and scabrous or minutely puberulent on the margins near the apex, pitless; awn of fertile lemma mostly 12–15 mm. long; pedicellate spikelets sterile, narrow, mostly 3.0–4.5 mm. long, longer than the supporting pedicels; pollen meiosis regular; chromosome number $2n=120$.

Type: Collected 2 August 1954 from plant grown in nursery of the Texas Agricultural Experiment Station, College Station, Texas, *F. W. Gould 6647* (type, TRACY; isotypes, US, UC, MICH, TEX). Original seed from Arteago, about 15 miles east of Saltillo, Coahuila, Mexico (*R. G. Reeves and Judd Morrow G-640*, altitude 6,000 feet, October 15, 1953, P. I. 216183).

Distribution: Known only from the Arteago collection.

This plant is similar to *Andropogon wrightii* Hack. in general aspect but also appears close to *A. saccharoides* Swartz. From the former it differs in the stiff blades, the smaller, more reduced pedicelled spikelets, the smaller, consistently non-pitted sessile spikelets, and in the uniformly regular pollen meiosis. From the latter it differs in the narrow stiff blades, and the inflorescence with a relatively short axis, few branches, and long terminal branches. *Andropogon reevesii* has a chromosome number of $2n=120$, while typical *A. saccharoides* has $2n=60$ chromosomes. *Andropogon saccharoides* var. *longipaniculata* Gould has $2n=120$ chromosomes but has a much larger and longer panicle, broader blades, and is a larger plant in general.

Andropogon hybridus sp. nov. Perennis cæspitosa erecta 30–80 cm. alta; nodi glabri vel puberuli; foliorum vaginæ virides glaucæ glabræ; laminæ 2–4 (–5) mm. latæ plerumque basin versus parce cilitæ sæpe in ambitu parce pilosæ; panicula 6–11 cm. longa non dense pilosa ramis 3–8 simplicibus vel inferioribus ramulosis in axi 0.6–3.5 (–4.5) cm. longo; racheos segmenta et pedicelli subæquales sulcati marginibus crassulis pilosis pilis apicem versus 5–7 mm. longis basin versus multo brevioribus; spicula sessilis 4.5–6.5 longa aristis 18–25 mm. longis, gluma inferior nitida luteo-viridi apicem versus quinquenervosa supra mediam glanduloso-pertusa, infra mediam plerumque parce pilosa; spicula pedicellata diminuta sterilis 2.2–3.6 mm. longa pedicello brevior; meiosis pollinis regularis; chromosomata somatica 120.

Perennial, with strictly erect culms in small to medium sized clumps; culms 30–80 cm. tall, moderately branched and leafy above the base; culm nodes glabrous or minutely puberulent; leaf sheaths green or glaucous,

glabrous; blades mostly 2–4 rarely –5 mm. broad, usually sparsely ciliate with long hairs near the base, often with a few hairs on the surfaces; panicles hairy but not densely so, 6–11 cm. long, usually with 3–8 primary branches on an axis 0.6–3.5, occasionally –4.5 cm. long, the lower branches often simply rebranched; rachis joints and pedicels about equal, with a broad, membranous, often dark-colored, central groove and thickened hairy margins, the hairs mostly 5–7 mm. long near the apex and much shorter towards the base; sessile spikelet 4.5–6.5 mm. long, with an awn 18–25 mm. long; first glume of sessile spikelet shiny, yellowish-green, with usually five greenish nerves apparent on the upper half, with a moderately deep glandular pit above the middle, and usually with a few stiff hairs on the lower one-third or one-half of the back; pedicelled spikelets highly reduced, sterile, mostly 2.2–3.6 mm. long and shorter than the supporting pedicel; pollen meiosis regular; chromosome number $2n=120$.

Type: Texas, La Salle County, two miles east of Cotulla, *F. W. Gould* 6978, 10 November 1955 (type, TRACY; isotypes, US, UC, TEX, MICH, SMU, ARIZ). The dominant grass along a low flat graded roadside ditch in a mesquite area, growing with *Pappophorum bicolor* and weedy forbs in gravelly red-brown clay. Type and isotypes from one plant.

Distribution: South-central Texas to northeastern Mexico.

Specimens examined: TEXAS. Atascosa County: Jourdan, 6223 (TRACY); Pleasanton, 6283 (TRACY). Bee County: 6.6 miles west of Beeville, 6051 (TRACY). Bexar County: San Antonio, *Higdon* in 1936 (TEX). Burnet County: Marble Falls, 5959 (TRACY). Cameron County: near San Benito, *Faulkner* 94 (TRACY). Dimmit County: Asherton, 6004 (TRACY). Gillespie County: 8 miles east of Fredericksburg, 5354 (TRACY); 11 miles east of Fredericksburg, 6487 (TRACY). Gonzales County: 8.5 miles south of Smiley, 6066 (TRACY); 8.5 miles south of Smiley, 6067 (TRACY). Guadalupe County: 19 miles west of Sequin, 6939 (TRACY). Kerr County: Kerrville, 6484 (TRACY). Kleberg County: 11 miles west of Kingsville, 6043 (TRACY); Kingsville, 6034 (TRACY). La Salle County: Cotulla, 6978 (TRACY). Live Oak County: George West, 6047 (TRACY); *Cummins* 12 (TRACY). Matagorda County: Palacios, *Richmon* 26 (TRACY). Maverick County: 10.5 miles south Quemando, 5997 (TRACY); Eagle Pass, 6473 (TRACY); west of La Pryor, near county line, 6475 (TRACY). Nueces County: western Nueces County, *Tharp* 47428 (TRACY). Real County: Camp Wood, 6952 (TRACY); Leaky, 6482 (TRACY). Travis County: 20 miles northwest of Oak Hill, 5961 (TRACY). Uvalde County: Uvalde, 6479 (TRACY); Uvalde 6226b (TRACY). Val Verde County: 30 miles west of Del Rio, *Rose* 71 (TRACY). Webb County: *Tharp* 5255 (TEX). MEXICO. COAHUILA. Sabinas, 6471.

This plant is intermediate between *Andropogon edwardsianus* Gould and *A. barbinodis* Lag. both in morphological characteristics and in chromosome number. From *A. edwardsianus* it differs in having broader blades, better developed upper culm leaves, more branched culms whose nodes often are puberulent, glume of sessile spikelet hairy below, panicle usually larger and more branched, and a $2n$ chromosome number of 120 rather than 60. From *A. barbinodis* it differs typically in the shorter, more erect, less branched culms, glabrous or puberulent nodes, narrower leaf blades, smaller panicles with fewer branches, these often all unbranched, shorter pedicellate spikelets, less hairy glume of sessile spikelets, and fewer chromosomes. In relatively few areas do plants of *A. barbinodis* have all sessile

spikelets pitted while in *A. hybridus* the sessile spikelets consistently are pitted.

Andropogon hybridus characteristically is a plant of moderately disturbed habitats. It is most frequent along low roadsides and fence-rows, often forming dense stands. Throughout its range it is consistently associated with *A. barbinodis* and either *A. saccharoides* var. *torreyanus* or *A. saccharoides* var. *longipaniculata*. ^{US}

Inflorescences of plants assumed to be hybrids between *A. hybridus* ($2n=120$) and *A. saccharoides* var. *longipaniculata* ($2n=120$) have been collected at two Texas localities (Bee County, 6.6 miles west of Beeville, 6050a; Uvalde County, 1.5 miles north of Uvalde, 6226c). No indications of hybridization between *A. hybridus* and *A. saccharoides* var. *torreyanus* or *A. barbinodis* have been observed. It is very possible, however, that the first two taxa, with $n=60$ and $n=30$ chromosomes respectively, have produced fertile allopolyploids referable to *A. barbinodis* ($n=90$).

Andropogon hybridus appears to have arisen from one or more hybrids between *A. edwardsianus* ($n=30$) and *A. saccharoides* var. *torreyanus*. Hybridization, followed by doubling of chromosome number, could well have produced this fully fertile species. *Andropogon hybridus* seems almost certainly to be a relatively "young" species whose success is correlated with man's occupation and development of the region in which it occurs. Despite its present abundance along roads and railroad rights-of-way, the favorite collecting sites of taxonomists, this grass is poorly represented in herbaria. All but one of the collections studied and cited in this paper were made in the last 20 years. A complete search has not been made of the large herbaria for early collections, but these are certain to be few.

Andropogon palmeri (Hack.) comb. nov. *Andropogon saccharoides* Swartz subsp. *leucopogon* var. *palmeri* Hack., in DC. Monogr. Phan. 6:496. 1889. *Amphilophis palmeri* Nash, Fl. N. Amer. 17: 126. 1912.

Type: Palmer 305 "Mexico ad Rio Blanco." 1886.

Specimens examined: Specimens from plants grown at College Station, Texas, from the following seed collections. MEXICO. DURANGO: between Torreon and Durango City, *Morrow* and *Merrill* G705 (P.I. 216186), between Zacatecas and Durango City, *Morrow* and *Merrill* G736 (P.I. 216196). Identification of this material was made by Jason R. Swallen of the United States National Museum.

Andropogon palmeri is similar to *A. barbinodis* in growth habit and inflorescence characteristics. It differs from this species primarily in having densely villous blades and sheaths. The first glume of the sessile spikelet may or may not be glandular-pitted. Although no accurate chromosome count has been obtained, it is most likely that this species has $2n=180$ chromosomes, the same as *A. barbinodis*.

ANDROPOGON BARBINODIS Lag. var. ***perforatus*** (Trin.) comb. nov. *Andropogon perforatus* Trin. ex Fourn. Mex. Pl. 2: 59. 1886. *A. saccharoides* subsp. *leucopogon* var. *perforatus* Hack., in DC. Monogr. Phan. 6:496. 1889. *Amphilophis perforatus* Nash, in Small, Fl. Southeast U. S.

66. 1903. *Bothriochloa perforata* Herter, Rev. Sudamer. Bot. 6:135. 1940. Type: *Berlandier* 641 "Envir. de Mexique."

Distribution: South-central U. S. and Mexico, Argentina, and Uruguay.

Specimens examined: UNITED STATES. TEXAS. Aransas County: Rockport, *Cates* in 1946 (TRACY). Bee County: west of Beeville, 6049 (TRACY). Bell County: near Little River, *Wolff* 2260 (TRACY). Hidalgo County: 12 miles north of Edinburg, 6024 (TRACY). Blanco County: west of Johnson City, 5963 (TRACY). Bosque County: 12 miles northeast of Walnut Springs, *Shinners* 10420 (SMU). Brooks County: 19 miles north of San Manuel, 6029 (TRACY). Brown County: Brownwood, 5681 (TRACY). Brewster County: Chisos Mts., *Sperry* 396 (TRACY). Caldwell County: Luling, 6938 (TRACY). Dimmit County: north of Carrizo Springs, *McCully* 32 (TRACY). Edwards County: Texas Agr. Exp. Station, Substation 14, *Cory* 52473 (SMU, UC), *Sperry* in 1947 (TRACY). Gillespie County: Fredericksburg, 5965 (TRACY); east of Seguin, 6069, 6070 (TRACY). Guadalupe County: 19 miles west of Seguin, 6942 (TRACY). Hays County: Kyle, *Tharp* in 1920 (MICH). Llano County: Llano, *Wolff* 3047 (TRACY); south of Valley Spring, *Smathers* 14 (TRACY); Enchanted Rock, *Tharp* 7699 (TEX). Maverick County: 16 miles east of Eagle Pass, 6973a (TRACY). McCulloch County: Lohn, *Whitaker* 50-16 (TRACY). McLennan County: east Waco, *Smith* 306 (TEX). Mitchell County: northeast of Colorado City, *Pohl* 4987 (SMU). Motley County: west of Matador, *Duval* 52-102 (RF 556) (TRACY). Pecos County: Fort Stockton, *Cory* in 1924 (TRACY). Palo Pinto County: west of Mineral Springs, *Whitehouse* 19296 (MICH, SMU). Somervell County: north of Glen Rose, *Evans* in 1951 (TRACY). Tarrant County: *Ruth* 1065 (MICH). Uvalde County: Montell, 6951 (TRACY); Sabinal, 6945 (TRACY). Young County: Graham, *Reverchon* 3439 (SMU). ARIZONA. Cochise County: Douglas, *Gould* and *Haskell* 4548, in part (SMU). Pima County: Santa Rita Range Reserve, *Culley* 58 (ARIZ). MEXICO. CHIHUAHUA. Agua Caliente, *LeSueur mex* 051, in part (SMU, UC); between Camargo and Parral, *Reeves* and *Morrow* G-493 (P.I. 216165), in part (TRACY); north of Chihuahua City, *Reeves* and *Morrow* G-362 (P.I. 216157) (TRACY). COAHUILA. 40 km. west of El Oro, *Harvey* 1275, in part (MICH); 10 miles north of Mondora, *Reeves* and *Morrow* G-328 (P.I. 216121) (TRACY). DURANGO. North of Durango City, *Reeves* and *Morrow* G-524 (P.I. 216122) (TRACY); between Durango City and Torreon, *Morrow* and *Merrill* G-841 (P.I. 216096) (TRACY); between Durango City and Mazatlan, *Morrow* and *Merrill* G-789 (P.I. 216088) (TRACY); between Durango City and Parral, *Morrow* and *Merrill* G-760 (P.I. 216080) (TRACY); Ignacio Allende, *Gentry* 6917 (ARIZ). HIDALGO. Ixtaccihuatl, *Purpus* in 1905 (UC); Pachuca, *Purpus* 1631 (UC, MICH); north of Zimapan, 7023 (TRACY). MEXICO (or D. F.). "Envir. de Mexique," *Berlandier* 641, fragment from type (US). SAN LUIS POTOSI. Charcos, *Whiting* 525 (TEX, ARIZ, MICH). VERA CRUZ: "Region d' Orizaba," *Bourgeau* 2374 (US). ZACATECAS. Zacatecas, *Pringle* 1761 (UC, ARIZ).

The writer's concept of this taxon is based on examination of a panicle fragment from the type and the original description by Fournier. The fragment, consisting of three inflorescence branches, was obtained for the United States National Herbarium by Dr. A. S. Hitchcock in 1907. The type is in the Trinius Herbarium at Leningrad and unavailable for study.

The following is a critical description of the fragment in the United States National Herbarium: longest raceme 6 cm.; rachis and pedicels ciliate with relatively long hairs; first glume of sessile spikelets averaging 5.8 mm. long, relatively narrow, rather thickly beset below the middle with stiff hairs, with a single moderately sized glandular pit or depression (averaging 0.23 mm. in diameter) about 2 mm. from the tip; awn of

lemma averaging 26 mm. long; pedicelled spikelets averaging 3.8 mm. long, slightly longer than the supporting pedicels.

Fournier in the original description stated, "Culmo ramiso, . . . nodis barbatis; panícula flabellata e fasciculatis divergentibus composita, . . .".

The hybrid origin of *Andropogon barbinodis* with its high chromosome number has been previously hypothesized (Gould, 1953). It is believed that the factors for pitted spikelets, short inflorescence axis, and brittle rachis have been introduced into this taxon from *A. edwardsianus* or directly from the Old World *A. pertusus* complex.

The glume pit occurs in *A. barbinodis* in all possible gradations, from a faintly discernible glandular spot on one or two spikelets of the panicle to a large, deep pit on all sessile spikelets. From one or more centers, the pit character has become dispersed in *A. barbinodis* populations almost throughout the range of the species. In North America the pits are most consistently present in plants of central Texas and eastern Mexico. Glume pits have been observed in specimens from New Mexico, Arizona, and even southern Utah (Washington County, near Springdale, *M. E. Jones 6071*, near St. George, *Gould 1359*).

It is the intent of the writer to assign to *A. barbinodis* var. *perforatus* all plants of the species in which the sessile spikelets predominantly are pitted. This criterion is somewhat arbitrary as there is no distinct break in the pitted-spikelet series, but it does conform with the established concept of the "perforatus" entity.

Plants referable to *A. barbinodis* var. *perforatus* generally have been confused with those of *A. hybridus* and *A. edwardsianus*, the only New World species consistently having pitted sessile spikelets. The *A. barbinodis* plants are most readily distinguished from those of these species by the taller, stouter, more freely branched and less strictly erect culms, broader blades, larger panicles, larger pedicelled spikelets, and more densely hairy glume of the sessile spikelet.

ANDROPOGON SACCHAROIDES Swartz var. *pulvinatus* var. nov. Perennis caespitosa 70–130 cm. alta; nodi plerumque breviter barbati; folia glabra saepe glauca, laminis 5–10 mm. latis; panícula exserta 8–16 cm. longa ramis 8–15 in axi 7–12 cm. longo, axillis atro- vel brunneo-pulvinatis; rami inferiores 2–5 cm. longi ramulosi in anthesis patentes demum contracti sed basi curvati; racheos segmenta et pedicelli pilosi pilis apicem versus 6–9 mm. longis, sulcata sulca media lata membranacea plerumque atrata; spicula sessilis 3–4 mm. longa lato-oblonga late acuta; spicula pedicellata 3 mm. longa pedicello plerumque brevior; chromosomata somatica 60.

Perennial bunchgrass; culms 70–130 cm. tall; culm nodes mostly short-bearded; leaves glabrous, often glaucous, the blades 5–10 mm. broad; panicle well exserted, 8–16 cm. long, with an axis mostly 7–12 cm. long and 8–15 primary branches; lower panicle branches 2–5 cm. long, mostly rebranched, spreading in anthesis but contracting in fruit, the bases re-

maining bowed-out; panicle branches with blackish or brownish, usually hairy pulvini in their axils; rachis joints nearly as long as the sessile spikelets, the latter overlapping for $\frac{1}{2}$ or less of their length; rachis joints and pedicels hairy, the hairs 6–9 mm. long near the apex, shorter below; groove of pedicel broad, membranous, usually dark-colored; sessile spikelets typically 3–4 mm. long, broadly oblong, with a broadly acute apex; pedicellate spikelets about 3 mm. long, usually slightly shorter than the supporting pedicels; chromosome number $2n=60$.

Type: Mexico. Coahuila, Rancho Sierra Hermosa, 40 miles west of Monclava, *F. W. Gould 6467*, 25 June 1952 (type, TRACY; isotype UC). On rocky, brushy slopes, at 6,700 feet altitude.

Distribution and specimens examined: Known only from the type collection and from plants grown at College Station, Texas, from seed from the type collection.

This variety differs from *A. saccharoides* var. *torreyanus* in the taller culms, larger panicles, spreading or loosely contracted inflorescence branches with axillary pulvini, and more widely spaced spikelets. From *A. saccharoides* var. *longipaniculata* it is distinguished by the spreading or more loosely contracted inflorescence branches, the pulvini, the more widely spaced and blunter spikelets, and the chromosome number of $2n=60$ rather than 120.

KEY TO THE NATIVE AND NATURALIZED SPECIES OF ANDROPOGON SUBGENUS AMPHILOPHIS IN THE UNITED STATES

I. All or some sessile spikelets pitless*

Pedicelled spikelets about as large and broad as the sessile ones.

Sessile spikelets more than 5 mm. long. Native species . . . 7. *A. wrightii*

Sessile spikelets less than 5 mm. long. Introduced species.

Panicle axis shorter than the branches; sessile spikelets

never pitted 9. *A. ischaemum*

Panicle axis longer than the branches; sessile spikelets

without pits or irregularly pitted 11. *A. intermedius*

Pedicelled spikelets much narrower and usually shorter than the sessile ones.

Sessile spikelets 4.5–7.3 mm. long, awns 20–33 mm. long (18–20 in California *A. barbinodis*); spikelets pitless or both pitted and pitless on the same panicle.

Panicle axis less than 5 cm. long; panicle branches 2–8; rachis joints and pedicels densely white villous; culms slender, not over 1 meter tall and usually much shorter; leaf blades rarely over 4 mm. broad; pollen grains averaging 36–41 microns in diameter; chromosome number $2n=120$

6. *A. springfieldii*

Panicle axis typically 5–15 cm. or more long; panicle branches typically numerous, rachis joints and pedicels villous but not densely so; culms typically stout, often over 1 meter tall; leaf blades, at least some, often 5–8 mm. broad.

Panicles of the larger culms 14–25 cm. long; culms very stout, stiffly erect, 1.2–2.5 meters tall, bluish glaucous below the nodes; culm nodes bearded with spreading hairs 3–6 mm. long; pollen averaging 39–40 microns in diameter; chromosome number, $2n=120$. . . 5. *A. altus*

*Refers to circular glandular depression on outer (first) glume.

- Panicles mostly 7–13 cm. long; culms curving-erect, tending to become decumbent and much-branched below in age, mostly 0.7–1.1 meters tall, not bluish glaucous below the nodes; culm nodes bearded with appressed hairs less than 3 mm. long; pollen averaging 45–52 microns in diameter; chromosome number, $2n=180$.
- Sessile spikelets all or mostly pitless 8a. *A. barbinodis* var. *barbinodis*
- Sessile spikelets mostly pitted 8b. *A. barbinodis* var. *perforatus*
- Sessile spikelets less than 4.5 mm. long, awn of lemma less than 19 mm. long; spikelets never pitted.
- Awns absent or not more than 6 mm. long 1. *A. exaristatus*
- Awns present, 8–18 mm. long.
- Panicles 5–9, occasionally –13 cm. long; glumes ovate, dull green and most commonly with a whitish waxy bloom; pollen averaging 34–37 microns in diameter; chromosome number, $2n=60$
- 2a. *A. saccharoides* var. *torreyanus*
- Panicles of the larger culms 10–20 cm. long; glumes narrowly ovate, shiny green; pollen averaging 39–42 microns in diameter; chromosome number, $2n=120$; southeastern and southern Texas to northern Mexico 2b. *A. saccharoides* var. *longipaniculata*

II. All sessile spikelets pitted

- Pedicelled spikelets about as large and broad as the sessile ones.
- Sessile spikelets more than 5 mm. long. Native species 7. *A. wrightii*
- Sessile spikelets less than 5 mm. long. Introduced species.
- Panicle axis shorter than the lower branches 10. *A. pertusus*
- Panicle axis longer than the lower branches 11. *A. intermedius*
- Pedicelled spikelets much narrower and usually shorter than the sessile ones.
- Panicle axis less than 5 cm. long; primary panicle branches mostly 2–7, rarely more than 8; culm nodes glabrous or minutely pubescent.
- Upper culm nodes glabrous; primary panicle branches never rebranched; first glume of sessile spikelet 5.5–7.0 mm. long, glabrous on back, with a relatively large and deep glandular pit; leaves mostly in dense basal tuft, the culm leaves reduced; leaf blades rarely over 2 mm. broad; chromosome number $2n=60$ 3. *A. edwardsianus*
- Upper culm nodes glabrous or puberulent; lower 1 or 2 panicle branches frequently rebranched; first glume of sessile spikelet 4.5–5.7 mm. long, usually sparsely hispid on back near base; glume pit relatively small and shallow; culm leaves well developed; blades 2–5 mm. broad; chromosome number, $2n=120$ 4. *A. hybridus*
- Panicle axis typically 5–15 cm. or more long; panicle branches numerous.
- Panicles of the larger culms 14–25 cm. long; culms very stout, stiffly erect, 1.2–2.5 meters tall, bluish glaucous below the nodes; culm nodes bearded with spreading hairs 3–6 mm. long; panicle axis and branches often remaining “kinked” from compression in the sheath; pollen averaging 39–40 microns in diameter; chromosome number, $2n=120$ 5. *A. altus*
- Panicles mostly 7–13 cm. long; culms curving-erect, tending to become decumbent and much branched below in age, mostly 0.7–1.1 meters tall, not bluish-glaucous below the nodes; culm nodes bearded with appressed hairs less than 3 mm. long; panicle axis and branches not “kinked”; pollen averaging 45–52 microns in diameter; chromosome number, $2n=180$ 8b. *A. barbinodis* var. *perforatus*

1. *A. EXARISTATUS* (Nash) Hitchc., Biol. Soc. Wash. Proc. 41:163. 1928. *Andropogon saccharoides* var. *submuticus* Vasey ex Hack. in DC.,

Monogr. Phan. 6:495. 1889. Not *A. submuticus* Steud., 1854. *Amphilophis exaristatus* Nash in Small, Fl. Southeast. U. S. 65. 1903. *Bothriochloa exaristata* (Nash) Henr. Blumea 4:520. 1941.

Distribution: Along the Gulf Coast of Louisiana and Texas; coastal Brazil, Argentina.

2a. *A. SACCHAROIDES* Swartz var. *TORREYANUS* (Steud.) Hack. in DC., Monogr. Phan. 6:495. 1889. *Andropogon glaucus* Torr., Ann. Lyc. N. Y. 1:153. 1824. Not *A. glaucus* Retz., 1789. *Andropogon torreyanus* Steud., Nom. Bot. ed. 2. 1:93. 1840. Based on *A. glaucus* Torr. *Andropogon jamesii* Torr. in Marcy, Expl. Red River 302. 1853.

Distribution: Alabama, Missouri and Colorado to northern Mexico.

2b. *A. SACCHAROIDES* var. *LONGIPANICULATA* Gould, Field and Lab. 23(1):17–19. 1955.

Distribution: Southern and southeastern Texas to northeastern Mexico.

3. *A. EDWARDSIANUS* Gould, Field and Lab. 19:183–185. 1951.

Distribution: Edwards Plateau of central Texas; Argentina and Uruguay.

4. *A. HYBRIDUS* Gould, sp. nov.

Distribution: Southern Texas and northeastern Mexico.

5. *A. ALTUS* Hitchc. Contr. U. S. Nat. Herb. 17(3):308. 1913.

Distribution: Western Texas and southern New Mexico to west-central Mexico; Bolivia and Argentina.

6. *A. SPRINGFIELDII* Gould, sp. nov.

Distribution: Western Texas and New Mexico to northern Arizona; Argentina.

7. *A. WRIGHTII* Hack. Flora 68:139. 1885. *Amphilophis wrightii* (Hack.) Nash. *Bothriochloa wrightii* (Hack.) Henr., Blumea 4:520. 1941.

Distribution: New Mexico and northern Mexico.

8a. *A. BARBINODIS* Lag. [Gen. et Sp. Nov. 3. 1816] var. *BARBINODIS*. *Amphilophis barbinodis* (Lag.) Nash in Small, Fl. Southeast. U. S. 65. 1903. *Bothriochloa barbinodis* (Lag.) Herter, Sudamer. Bot. Rev. 6:135. 1940.

Distribution: Texas, southern Colorado, Utah, and California, south to Argentina.

8b. *A. BARBINODIS* Lag. var. *PERFORATUS* (Trin.) Gould, comb. nov.

Distribution: South-central U. S., Mexico, Argentina, and Uruguay.

9. *A. ISCHAEMUM* L. Sp. Pl. 1047. 1753. *Amphilophis ischaemum* (L.) Nash, N. Amer. Fl. 17:124. 1912. *Bothriochloa ischaemum* (L.) Keng. Contr. Biol. Lab. Sci. Soc. China Bot. Ser. 10:201. 1936.

Distribution: Widespread in tropical and temperate regions of Asia,

Africa and Europe. Established as a pasture and wayside grass in Texas and occasional elsewhere in the United States from pasture plantings.

10. A. PERTUSUS (L.) Willd., Sp. Pl. 4:922. 1806. *Amphilophis pertusa* (L.) Stapf. in Prain, Fl. Trop. Afr. 9:175. 1917. *Bothriochloa pertusa* (L.) A. Camus, Ann. Soc. Lyon n. ser. 76:164. 1931.

Distribution: Tropical and subtropical Asia, Africa, and Australia. Occasional in southern Texas as a seeded pasture grass.

11. A. INTERMEDIUS R. Br., Prodr. Fl. Nov. Holl. 202. 1810. *Amphilophis intermedia* (R. Br.) Stapf in Prain, Fl. Trop. Afr. 9:174. 1917. *Bothriochloa intermedia* (R. Br.) A. Camus, Ann. Soc. Linn. Lyon n. ser. 76:164. 1931.

Distribution: China, India, the Indo-Malay region and Australia. Introduced as a pasture grass in Texas.

SUMMARY

Three new species, one new variety, and two new name combinations are proposed in *Andropogon*, subgenus *Amphilophis*. A key is presented to the eight indigenous and three naturalized species of this subgenus occurring in the United States. A unique feature of the key is the prominent use of the glume pit character. Of the species included in the key, the glandular glume pit is consistently present in three, consistently absent in four, and of variable occurrence in five.

Department of Range and Forestry,
Texas Agricultural Experiment Station and
A. and M. College of Texas, College Station, Texas

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